Tuning Guide

Piaggio Runner 125/180
& Hexagon LXT

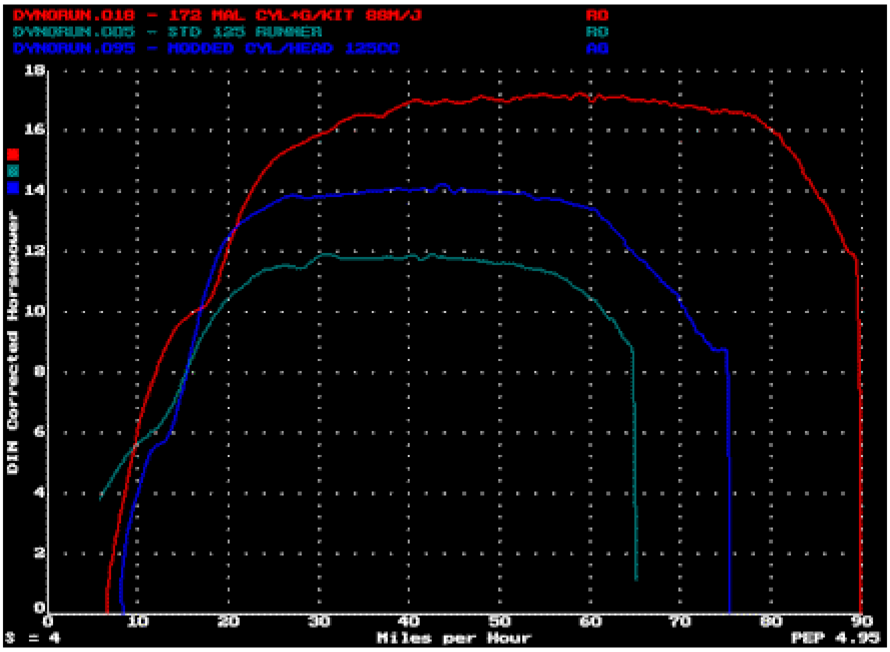
The latest version of the 125 water-cooled motor is very similar to the air-cooled Typhoon and Skipper motor and the water-cooled Hexagon, with minor improvements to several parts of the motor. But all the things that apply to the air-cooled and older water-cooled motors still apply.

It is possible to modify the original 125 cylinder and head, fit the 150 Piaggio cylinder and head or to just fit the Malossi 172 kit cylinder and head. The Piaggio 180 cylinder does not fit the 125 crankcases.

The 125 transmission is similar to the Typhoon and Hexagon motors. It uses the same gear ratio but the spline fitting is different. Because of the 12" tyres the overall gearing is higher. Malossi make a gear kit with the different spline for the 125.

- A standard 125 gives 12bhp
- A standard 150 gives 13bhp
- A modified 125 gives 14bhp
- A 172 Malossi kit gives 17.5bhp
- A 180 motor gives 16.5bhp

(The above power figures are at the rear wheel with standard carb and exhaust.)



DYNO GRAPH 1

Standard 125 v. Modded 125 v. Malossi 172 Cylinder & Gear Kit(green, blue and red respectively)

As the 180 Cup Race series in Italy uses the 125 Runner fitted with a standard 172 Malossi kit there have been a number of new parts available for these motors that were not previously available. These include:

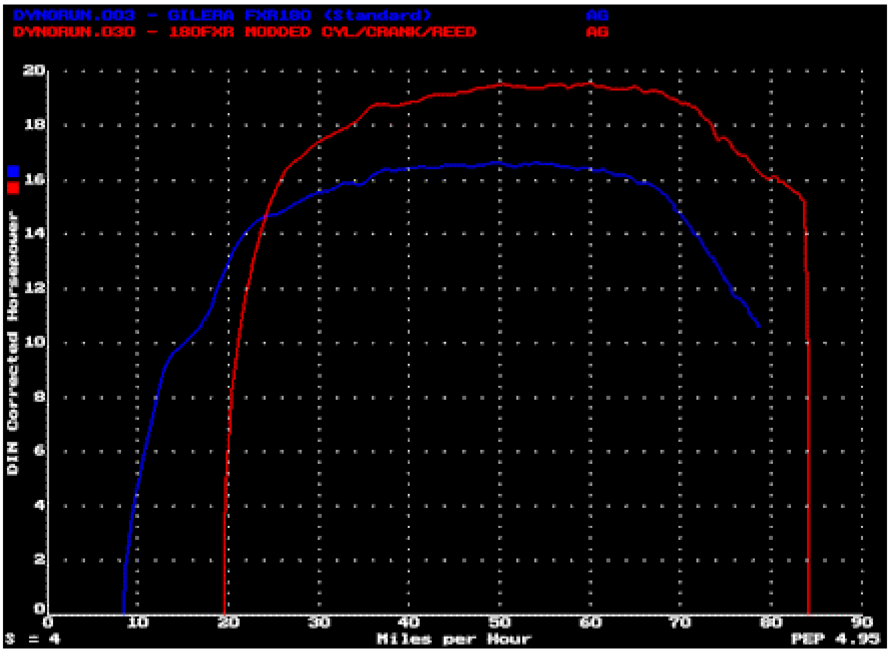
1. Competition Crankshaft with improved conrod, big end and semi-full circle.
2. Competition Exhaust to suit the standard 172 Malossi kit, worth approximately 2bhp (does not work on a 125 motor, and not as effective on a 180 motor unless the porting and cylinder head is modified to Malossi porting spec).
3. Uprated Clutch Springs, allowing a choice of springs to really make it move from standstill - essential if the competition exhaust is used.
4. 25mm Race Carb Kit & Down-draft Inlet Rubber: the carb will fit the standard rubber but it interferes with the mudguard. It is supposed to be used with the race inlet rubber but this requires modifications to the bottom of the helmet holder box to create clearance. This is the best position for performance from the carburettor.

Our solution for road machines is to use the 25mm carb with an offset rubber to clear the mudguard and helmet compartment, and a large RamAir filter fitted onto a carb filter adapter. This clears the helmet holder base but does not line up with the air filter box outlet, so the air filter box is removed and a large RamAir filter and filter adapter used instead. If you wish to keep the air filter box there is now a 24mm flatslide Mikuni carb that will replace the original carb.

Malossi claim 26cv for the 180 Cup race scooters using exhaust, cylinder, crankshaft and carb conversion. Our experience on our Dynojet Rolling Road suggests that 23bhp is likely to be the average power output but that further work to the cylinder and cases would improve this.

The 180 motor has several differences to the 125. Most importantly, the cylinder is 65.6 bore and has a 2mm bigger cylinder spigot. This is why the cylinder will not fit the 125 motor without modifying the 125 cases. The crankshaft is beefed up slightly using a 22mm big end pin (125 is 20mm) and the crank web’s diameter is 2mm bigger to accommodate this - hence the case has a bigger opening for the crank web to fit into. The front pulley (variator) uses 20mm rollers (125 is 19mm) and the rear clutch has a cooling fan built into it to increase cooling. It is possible to use a Japanese conrod for improved reliability when padding the 180 crankshaft.

DYNO GRAPH 2



Standard 180 v. Modded 180 with Polini Reed & Padded Crankshaft
(blue and red respectively)

The other major difference on the 180 is the use of a different gearbox layout. Where the middle shaft on previous models had an interference fit between shaft and gear, these are now splined, and there is now an interference fit where the output shaft was splined on the 125/150's. All the later 125 models follow this gear box layout. There are now gear kits available to fit all these different models.

The porting/machining work to the cylinder and head, together with padding the original crank and fitting the larger Polini reed block, has improved power to 19.6/19.8bhp at the rear wheel from the standard 16.5bhp. This is still using the standard carb and exhaust and enables speedo readings of 95-100mph to be seen (approximately 10mph up on standard).

We can improve standard performance by a further 2.0bhp by using the 25mm carb conversion on this motor with the crank and cylinder conversion (still using standard exhaust).

The cylinder and head can be altered to a similar specification as the Malossi cylinder and this gives 17.5-18bhp without the crank modifications (standard carb and exhaust).

One of the other differences compared with the older 125 motors is that there is a new reed block with fibre petals fitted as standard. There is now no advantage from changing petals unless the rev range is changed considerably - then 0.30 petals instead of the 0.35 fitted as standard are beneficial, or a Malossi complete reed assembly with 0.30 carbon fibre petals as used in the 180 Cup Race series.

180 motors use the older block with 0.45 petals. Changing to lighter ones is beneficial if cylinder alterations are made.

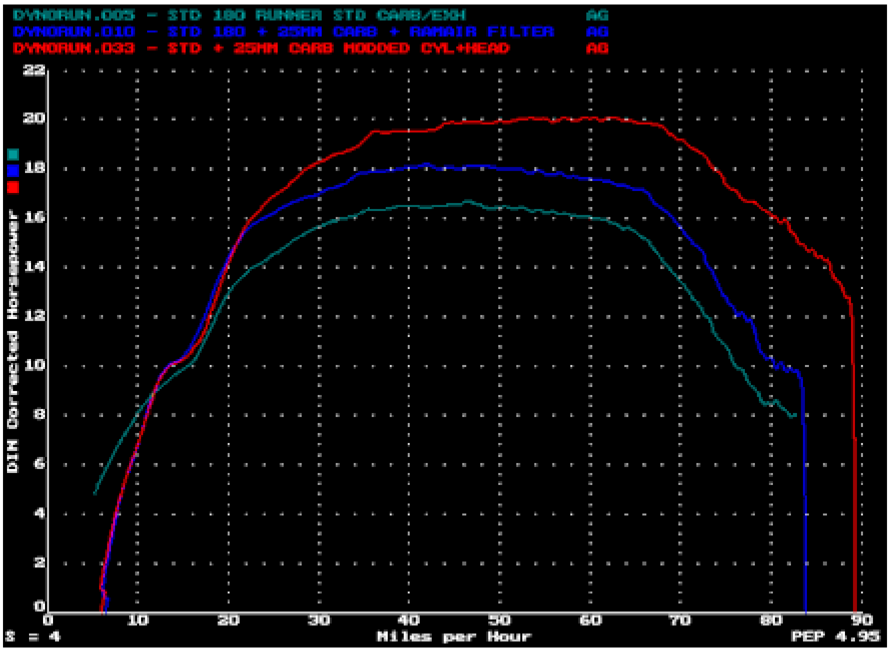
When the time comes to change the drive belt the Malossi drive belt is better than the original, although they both cope with the modified engine.

Instead of modifying the 180 head to a higher compression, it is possible to use the standard 172 Malossi head instead, or modified to further increase the compression ratio. (The 180 head has 9.8:1 compression ratio, compared with the standard Malossi 11:1.) As standard it has a better shape than the modified 180 head.

Update

Without modifying the crankshaft but using the larger 25mm carb kit it is possible with some cylinder porting, a Malossi reed block and carb modifications, to obtain 20bhp from the standard exhaust.

DYNO GRAPH 3



Comparing: Standard 180,
Standard 180 with 25mm carb & RamAir filter,
The same plus modified cylinder & cylinder head
(green, blue & red repsectively)
All with standard bottom end & exhaust

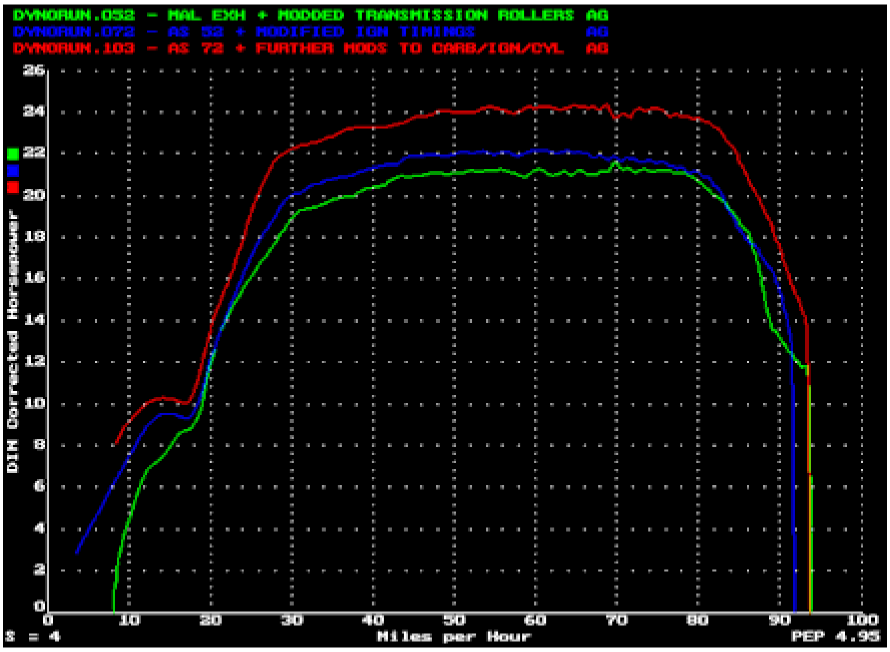
Because of the limitations imposed by the ignition system on the water-cooled motor, where the ignition timing is variable and retards at 9,000rpm to approximately 10/11 degrees, the peak power must be engineered to be around 8,500/8,800 rpm. This limits performance.

Although using the Malossi exhaust gives extra power, it is at approximately 9,500 on the modified motors, and although it will give 1.3 to 1.5 bhp extra it will give 2.5bhp extra if the ignition system is changed to obtain fixed timing which can then be optimised for peak power rpm.

Without modifying the crankcase or crankshaft it is possible to obtain 24bhp at rear wheel at 9,800 rpm using the following parts/modifications:

- Malossi Competition Exhaust
- Malossi Cylinder Head Modified
- 180 Cylinder Head Modified
- Malossi Reed Block Assembly
- Malossi Carb Rubber Angled
- Modified 25mm PHBH Carb with RamAir and Adapter
- Ignition Stator/Flywheel/Coil with Modified Pickup

DYNO GRAPH 4



Comparing: Modified cylinder & head with 25mm carb & Malossi exhaust,
The same plus modified ignition system,
Plus additional modifications to head, cylinder, carb and reed valve
(green, blue & red repsectively)

Latest News

Malossi have now updated the 172 cylinder kit so that it will fit both the 125 and 180 engine units. The revisions to the cylinder layout have increased power by approximately 1bhp when compared to the kits in the text above.

Polini have announced a competition exhaust for the Typhoon 125 that fits on the Runner engines. Provided that it is used with the 125 cylinder or the 172 Malossi cylinder, power is similar to the Malossi race exhaust but with better bottom end power. Like the Malossi exhaust, when used on the Piaggio 180 cylinders peak power is 9,500rpm, but when used on the 172 kits peak power is 8,500rpm.

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